

Appendix E: Programmable Telemetry Processor (PTP) Automation

PTP Automation Installation

PTP automation requires some extra configuration of the PTP and the controlling node during installation of the automation system. The PTP must be configured so recorder module data files can be copied to the node and the PTP can be left in a near startup state when the pass is complete.

Configure the PTP for Automation

- (1) To copy the data file from the PTP to the node, the assigned PTP must have the proper sharenames and the guest must be enabled.
 - (a) To create the "PTP-C" sharename for drive C:
 - ✓ right click on C: in explorer
 - ✓ click sharing
 - ✓ click New Share
 - ✓ type PTP-C
 - ✓ click Permissions and set to Everyone Full Control
 - ✓ click Add
 - ✓ click OK
 - ✓ click Apply
 - ✓ click Ok
 - (b) To create the "PTP-D" sharename if the PTP has a D drive:
 - ✓ right click on D: in explorer
 - ✓ click sharing
 - ✓ click New Share
 - ✓ type PTP-D
 - ✓ click Permissions and set to Everyone Full Control
 - ✓ click Add
 - ✓ click OK
 - ✓ click Apply
 - ✓ click Ok
 - (c) To enable the guest:
 - ✓ click Start, Programs, Administrative Tools
 - ✓ click User Manager
 - ✓ double click Guest
 - ✓ uncheck Account Disabled
 - ✓ click Ok
 - ✓ Exit User Manager Window
- (2) The PTP should have a desktop called NOTHING.DTP in its c:\PTP_User\Desktop directory. The node code tells the PTP to load NOTHING.DTP (if it exists in the correct directory) as the last command in the takedown section. The Nothing.DTP desktop has no modules, so by loading Nothing.DTP the PTP is left in a near startup state. When the next desktop is loaded the PTP will not have to close modules before opening the modules of the desktop being loaded. Less strain and quicker response.

Configure the Node for PTP Automation

- (1) The node code needs to know the IP address of the SAFS server in order to transfer data files to SAFS. If the SAFS server is not configured in the Domain Name Server, the node must have a C:\WINNT\system32\drivers\etc\lmhosts file that contains a list of SAFS servers and their IP addresses. Administrator privileges are required to create or change this file. Each entry should be kept on an individual line. The IP address should be placed in the first column followed by the corresponding

- computername. The address and the computername should be separated by at least one space or tab. The "#" character is generally used to denote the start of a comment.
- (2) The node must have a C:\PTP_User\Logs directory to store a copy of the recorder data file produced by the PTP.
 - (a) At takedown the PTP file named in the recorder module structure is copied to the node. The node copy is named using SAFS naming convention and is transferred to SAFS. If the transfer is successful the copy is deleted from the node C:\PTP_User\Logs directory, otherwise the data file stays on the node computer until it is manually removed.
 - (b) For each recorder module in a stream definition three files are produced. The PTP creates and propagates the .dat file. The node software creates corresponding metadata (.mta) and flag (.flg) files on C:\Node. The metadata is a summary of the statistics for the data stream; selected Serial Input and Virtual Channel Processor information is reported if these modules appear in the data stream (See What is Metadata? for an example of a metadata file). The flag file contains the names of the data and metadata files.
 - (c) If the data and metadata files are successfully transferred the flag file is also transferred.
 - (d) If all files are successfully transferred, the three files (.dat, .mta, and .flg) are deleted from the node computer. If the data, metadata, and/or flag files are not transferred all three files remain on the node computer until they are manually removed.

Mission information needed to automate a PTP

Several pieces of information must be obtained from the Interface Control Document (ICD) to correctly automate the PTP and distribute the statistics to the customers. The information can be broken into three categories: information needed to create a desktop, information that describes the desktop streams, and information that describes the pass.

DESKTOP

All the information required to configure each module of a working desktop. This desktop could also be used manually.

PTP CONFIGURATION/PROFILE

This file is used at Setup to set the ping state, load the PTP desktop, and define the data streams. In order to create this file, the desktop must have been created. It is recommended that this file be created as soon as the operational desktop is complete and named the same as the desktop only with a .ptp extension. The information in this configuration file must accurately describe the data streams in the desktop. The node code will check the module type associated with a module number. If the module type defined does not match the module type registered by the PTP, the node will send an error message and setup will fail. The PTP configuration file must be created and edited with the PTP GUI since the stream definitions are binary.

- (1) Ping State - whether the ping should be enabled or disabled?
- (2) Desktop Name - which desktop to load onto the PTP for the pass.
- (3) Stream Definitions - identify data streams, their type, and which modules define the stream.
 - (a) NAME - open text describing stream content, use, owner etc. Reported in Metadata file.
 - (b) TYPE - translates into a 1-character field for use by WOTIS and high level status. There should be at most one Commanding stream, at most one TM Non CCSDS stream, and at most one TM CCSDS 1 stream. If there are more than one of each of these stream types only the last stream will be used to report summary information to WOTIS. The other six stream types may be repeated within a desktop. Stream types are:

Base Band 1	(A)
Base Band 2	(B)
Commanding	(C)
Command Echo	(E)
TM Non CCSDS	(R)
TM CCSDS 1	(T)
TM CCSDS 2	(U)
Subcarrier 1	(S)

Subcarrier 2 (V)

- (c) TAG - used to create a complete filename for SAFS. If PTP recorder module files are to sent to SAFS, SAFS must have a subdirectory matching the TAG value under the satellite ID directory. Only crucial to streams producing files to be sent to SAFS.
- (d) MODULES IN STREAM - repeated for each module in the stream.
 - (i) Module Number - use desktop as reference.
 - (ii) Module Type - use desktop as reference.

METADATA

This information is reported on the metadata file created for every recorder module contained in a stream definition. The metadata file is created even if the data files are not sent to SAFS. The Information needed:

- ✓ SPACECRAFT ID
- ✓ TR CODE
- ✓ SCHEDULED START DATE
- ✓ SCHEDULED STOP DATE
- ✓ ORBIT NUMBER
- ✓ GENERATION SITE
- ✓ PTP ID

PTP GUI**DataStreams**

The DataStreams window is used to create or modify the PTP configuration/profile file. Stream definitions are binary, so modification of PTP configuration files containing stream definitions must be done using the PTP GUI. Do not use a text editor.

- (1) Ping Enabled – Check box whose default is to disable the ping.
- (2) Desktop – Name of the desktop to load on the PTP. Directory path C:\PTP_User\Desktop is expected.
- (3) Stream Definition – Buttons are provided to help the user move between streams and create, delete, or modify the stream definitions. Definition of streams breaks down into two areas: identifying the stream and describing its contents. The engineer must provide this information. The desktop configuration defines the streams, but the stream definitions route the data to the user.
 - (A) Stream Identification
 - (a) Name – Identification reported on metadata file.
 - (b) Type – Used to identify Commanding, TM Non CCSDS, and TM CCSDS 1 information for high level status. Also reported on the metadata and log files.
 - (c) Tag - Used as subdirectory in SAFS path and part of SAFS filename.
 - (B) Stream Contents – Use the desktop as a Guide.
 - (a) Module Number – Desktop module number.
 - (b) Module Type– Must match desktop or CheckStreamDef will produce an error and setup will fail.

Control

This window gives back the control lost by CONSOLE.EXE when the node has control of port 4000. Operator can enable or disable modules and zero counters.

Status

CONSOLE.EXE in “Receive Multicast Status” mode supplies the user with detailed module status and configuration information. This program is written by AVTEC. When the console software becomes stable and AVTEC gives its approval, a CONSOLE window will come up with the DataStream and Control windows when the PTP GUI is started. Until then, CONSOLE.EXE should be run on a PTP not being used for automation.

Automated Pass

This section describes what happens to the PTP during an automated pass and what is needed to transfer the required files to SAFS. It also specifies what is necessary for a PTP to be remotely assigned, setup for an automated pass, and returned to startup condition after a pass.

PTP assignment

- (1) Desired PTP must be turned on.
- (2) A server (black window) with port 4000 in "Waiting" (See "Remote Control" line about 5 lines from the top of the window).

The node expects to connect to port 4000, so a server with port 4001, 4002, etc. is of no use. Only one user can be in control of a PTP server port at a time, if another user is in control of port 4000 the node code can't gain control and will wait for control to be released.

After the node has taken control "Waiting" will change to the IP address of the node computer. If port 4000 is not "Waiting" the computer with the IP address shown after "Remote Control" is the source of control for that server.

CONSOLE.EXE control can be released by clicking "System" "Release Control" in the console window that is in control of the server. If CONSOLE.EXE is in control of a PTP server, "Connection" followed by the port and IP address of the server appears in the title bar of the window. A CONSOLE.EXE with "Status" in the title bar can only receive information from the PTP server identified by the port and IP address.

Clicking the "x" on the PTP_NT Server title bar is an unfriendly but effective way to make sure no one has control of that server. A new PTP_NT.EXE would have to be started, but no one would be in control of the new server.
- (3) Avtec PTP must be registered in the GRM reg files.
- (4) If the desired PTP has port 4000 in "Waiting" on its server and is in the GRM registry file when the device GRM is started, the node code will attempt to take control of the PTP.

If the GRM is successful the "Waiting 4000" on the PTP server will change to the IP address of the node computer. If port 4000 is not in "Waiting" when the device GRM starts, the device GRM will not reach its ready state because the ptpConnectToServer command is waiting for someone to release control of the PTP before it can execute the connect command (see step 2). The device GRM may appear to be hung, check the PTP server to see who is in control.
- (5) When the device GRM is ready, the operations GRM is started.

If the operations reaches its ready state and the PTP does not failed reset, the PTP is assigned.

PTP Setup

- (1) Make sure desired desktop is in the correct directory on the PTP.

Expected directory is: C:\ptp_User\desktops
- (2) The desired PTP has been assigned.
- (3) Make sure the correct PTP configuration/profile file is used.

Profile includes (minimum) the desktop name as the argument to LoadProfile. SetStreamDef commands follow the LoadProfile command. If the desktop is not on the requested PTP in the requested directory, the PTP will not be able to load the requested desktop and Verify will fail. Verify will also fail if the stream definitions module types do not match the module type information obtained by the node code when the desktop was loaded. If no streams are defined there will be no high level status information or module status reported to the log file. If stream definitions are included the PTP configuration must be created using the PTP GUI, the stream definitions are binary and a text editor will not work.

The name of the desktop currently loaded on the PTP is included in the CheckStreamDef error message starting with ATS release 2.0. If DEFAULT.DTP or NOTHING.DTP is listed as the current desktop, the requested desktop is probably not in the proper directory on the PTP. If the current desktop matches the name of the desktop requested, one or more of the module types in the stream definitions are incorrect.
- (4) The PTP configuration file is read and the embedded functions are executed.

The first function executed will probably be SetPingState (See To Ping or Not to Ping?) which enables or disables the PTP ping. LoadProfile loads the corresponding desktop on the PTP. SetStreamDef is executed for each stream defined.

PTP Start

- (1) Enable all modules.
- (2) Obtain system time to report actual start time on metadata file.

PTP Stop

- (2) Disable all modules.
- (2) Obtain system time to report actual stop time on metadata file.

PTP Takedown

Variations in the amount of time needed to complete takedown correspond to the time required to transfer the SAFS files.

- (1) GetDataParameters to obtain module types and file names.
- (2) Cycle through the modules, if recorder module close data file.
- (3) Poll all the modules in case status has been turned off.
- (4) Wait 15 seconds to make sure all modules have been polled.
- (5) GetDataParameters again to obtain current module status.
- (6) Set PTP sharename.
- (7) If there are recorder modules and SAFS ID > 0, try to connect to local SAFS (LMHOSTS).
- (8) Write log file by stream.
 - (a) Write requested module information to log file.
 - (b) If module type is recorder, create metadata file.
 - (i) Copy the data file from the PTP.
 - (ii) Transfer the data file to SAFS if connected.
 - (iii) Create metadata file.
 - (iv) Transfer metadata file if SAFS connected.
 - (v) Create flag file.
 - (vi) Transfer flag file if SAFS connected.
 - (vii) Delete data, metadata and flag files from Node if they were transferred.
- (6) Close SAFS connection if applicable.
- (7) Load Nothing.DTP (has no modules so PTP is in near startup state).

Send SAFS files

SAFS files will be transferred if all the following conditions exist.

- (1) SAFS is chosen as a resource.
- (2) SAFS is up and running with proper connections
- (3) SAFS directories are available.

QuikSCAT science data QST1998212245PTP1SCI.dat would be sent to directory \QST\SCI where SCI is the "tag" of the stream definition and QST is the satellite ID.
- (4) The PTP configuration file has at least one stream definition that includes a recorder module.
- (5) The requested PTP has a directory path that matches the path used in the recorder module configuration.
- (6) Automated PTP and node complete takedown.

What is Metadata?

Metadata files are created at TakeDown for defined data streams that contain a recorder module. The metadata files are created on the node computer and are named with the convention: PrjIDYYYYMMDDHHMMSSP##typ.mta (example: QST19980812202020P01SCI.mta corresponding to QuikScat Science data recorded on PTP 01 on 8/12/98 at 20:20:20 GMT, project/satellite ID is QST and the stream definition tag is SCI). The corresponding data file, the metadata file, and a corresponding flag

file (contains the names of the data and the metadata files) are transferred to SAFS directory (example: \QST\SCI). If the transfers are successful the three files are deleted from the node computer. If any of the transfers fail the files remain on the node computer and the failure is logged. The metadata file contains a header that describes the file followed by Serial Input and CCSDS Virtual Channel Processor statistics if that module type is in the stream definition. The stream definitions are supplied in the PTP configuration file along with the desktop used.

METADATA FILE CONTAINS:

datRemoteFilename SUMMARY

FILE SIZE BYTES:	dataFileSize
FILE DATE:	dataFileDate
SPACECRAFT ID:	satelliteId
MODE:	trCode
SCHEDULED START DATE:	schStartTime
SCHEDULED STOP DATE:	schStopTime
ACTUAL START DATE:	actualStartTime
ACTUAL STOP DATE:	actualStopTime
ORBIT NUMBER:	orbitNumber
GENERATION SITE:	siteId
PTP ID:	PTP_unit
DESKTOP:	desktopName
STREAM NAME:	streamName
STREAM TYPE:	streamType

MODULE NUMBER:	mm	Serial Input
FRAMES RECD:	framesReceived	
FRAMES READ:	framesRead	
SYNC BIT ERRORS:	syncPatternBitErrors	
DROPOUTS:	dropouts	
SLIPS:	slips	
LONG FRAMES:	longFrames	
SHORT FRAMES:	shortFrames	

MODULE NUMBER: mm CCSDS Virtual Channel Processor

VCID:	nn
RECEIVED COUNT:	vcReceivedCount[nn]
TRANSMIT COUNT:	vcTransmitCount[nn]
SEQUENCE ERRORS:	vcSequenceErrs[nn]
CRC ERRORS:	vcCRCErrs[nn]
CORRECTABLE RS ERRS:	vcCorrectableRsErrs[nn]
UNCORRECTABLE RS ERRS:	vcUnCorrectableRsErrs[nn]

datRemoteFilename END OF SUMMARY

To Ping or Not to Ping?

The switch to enable or disable the PTP is a check box on the PTP GUI DataStreams window used to create the PTP configuration file. The default is to disable the ping. If the box is checked the ptpEnablePingEx command will be sent to the PTP at setup when the configuration file commands are executed; otherwise the ptpDisablePingEx command will be executed.

ORIGINAL PROBLEM

If sockets are opened in block mode and the transmit side is open, a broken network connection is detectable. However if in read only block mode (which all PTPs are) and the network connection is broken, it will be approximately six days before the server knows the client went away.